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SELF-CORROSION OF IRON AND STEEL PIPES¹

BY ALFRED DOUGLAS FLINN²

Mr. W. Nelson Smith, Consulting Electrical Engineer, Winnipeg Electric Railway Company, reports cases of self-corrosion of iron pipes at Selkirk (near Winnipeg) and at Brandon, both in Manitoba, at Calgary, Alberta, and at Pierre, South Dakota, in which it is claimed that stray electric currents could have had no part, because of the remoteness from any source of such currents. Mr. Smith states that such corrosion occurs on the barrel of the pipe as well as at joints, and is sometimes mistaken for the effects of stray current electrolysis. He also reports that in the wet alkaline clay soils of Western Canada, in which self-corrosion occurs, serious deterioration of Portland cement concrete also takes place.

So called "self-corrosion" of iron and steel pipes has long been known. It has been observed in situations where stray currents from railways were impossible, or where they were not detectable by available means. Other deterioration of iron pipes, without the action of stray current, has also long been known, including so-called "graphitic corrosion." It is possible that effects may occur in alkaline soils like those in acid impregnated earth because of the release of the acid radical of the alkali in the presence of the metal.

From statements made by Mr. Smith, it appears that sellers and users of cast iron pipes in the three prairie provinces of Canada, where soil of the nature mentioned is found, have assumed that such pipes would be very durable as they had been in many localities in the eastern United States and in Europe. He reports that in these three provinces

Self-corrosion of cast iron pipes proceeds with fair rapidity, ...
That lead pipes and lead sheaths of cables are not as chemically inert as has

¹ An abstract of material issued elsewhere by Mr. W. Nelson Smith. These notes were prepared by Mr. Flinn for the readers of this Journal. Discussion is invited and should be sent to the Editor.

² Representative, American Committee in Electrolysis, of American Water Works Association, Secretary, United Engineering Society and Engineering Foundation, New York.

been supposed in the presence of neutral salts of this character, especially where nitrates are also present, or capable of being formed from ammonia present in the soil. Under such circumstances, self-corrosion of lead has been observed, both in the laboratory and in natural soil, without any access of stray current. Copper, in contact with neutral solutions of any of the alkaline salts and accompanied by nitrates, will also corrode rapidly when no stray current is present, and a copper ground plate connection was completely corroded to destruction beneath the concrete basement floor of a telephone exchange in St. Boniface, Manitoba, where it could not possibly have formed part of the path of a stray railway return current.